

UNITED STATES DEPARTMENT OF AGRICULTURE  
BUREAU OF ENTOMOLOGY  
FOREST INSECT INVESTIGATIONS

FINAL REPORT OF THE 1931 FOREST INSECT SURVEY  
OF THE COEUR D'ALENE NATIONAL FOREST,  
WITH RECOMMENDATIONS FOR CONTROL

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INTRODUCTION

Under date of October 29, 1931, a preliminary report covering the 1931 Coeur d'Alene insect survey was prepared by Mr. Evenden for presentation at a meeting held in Denver, Colorado, on November 2nd. This report was prepared in the absence of Mr. Terrell, who was in charge of this survey, and at that time he had not been privileged to thoroughly analyze his data. In the submission of this early report it was asked that it be regarded as being entirely preliminary in character, as the writer was not familiar with the more intimate details of the survey.

The purpose of this report is to present a completed summary of the survey data, with a more complete analysis of the existing situation. In studying the data from different units with the idea of determining the necessity for control, an attempt was made to weigh such factors as the occurrence of windfalls, per cent of stand infested, and severity of the attack, in addition to the number of infested trees per acre. However, as these factors were based upon the rather small number of infested trees which were located on the sample strips run on each unit during the 1931 survey, the probable error associated with their use made the value of such items confusing and questionable. Some changes have been made in the recommendations as submitted in the preliminary report relative

to area to be covered by control, as well as some very marked reductions in the acreages of units.

#### 1931 Situation

Though in 1929 a small area in the Steamboat Creek drainage of the Coeur d'Alene Forest was covered by control it has not been considered as being a part of the present project, and has not been considered in the following summary. In 1929 a survey of the Coeur d'Alene Forest showed that there were some 25,904 infested trees on 99,228 acres. In 1930 a survey of the forest showed 9,637 trees on an area of 109,270 acres, indicating a reduction of 63 per cent in the number of infested trees regardless of an increased acreage of 10 per cent. In 1931 a similar survey shows that there are 12,786 trees on areas totaling 128,780 acres, which gives an increase of 33 per cent in the number of infested trees, on however an increased acreage of 13 per cent. If applied to the same acreage as surveyed in 1930, the survey data would only show an increase of some 12 per cent in the number of infested trees. Though the first reaction one secures from these data is not a very favorable one, all factors involved should be carefully considered before final judgment is passed.

The Coeur d'Alene insect control project was instituted in 1930 on a somewhat experimental basis. It was the largest barkbeetle control project ever undertaken, and was the first attempt to control such a large scale outbreak of the mountain pine beetle in white pine. Though it was sincerely believed that from the institution of control the potential epidemic which existed on this forest could be eliminated and

a repetition of the devastation which was taking place on other forests prevented, there were other more obscure factors which could not be weighed at the time the work was started. The most important of these factors were the point to which such an outbreak must be reduced and the length of time this point need be maintained before the operation could be safely discontinued. Also the interrelation of the different units within the project, the degree of infestation which should be treated, and the extent to which one should go in attempting to secure a 100 per cent cleanup of the infested areas covered by control were items not thoroughly understood. In brief, it can be said that though the effectiveness of control was sincerely believed in, it was fully realized that with such a large project a complete plan of operation could not be offered, and that situations would no doubt occur calling for careful consideration before a solution could be offered. It is the purpose of this discussion to attempt an analysis of the existing situation which confronts us at this time.

The first question which would be asked would no doubt be in relation to the success of the project. Under the most favorable situations the measurement of artificial control is a difficult task, for with the institution of control all evidence of what might have occurred is destroyed. On the Coeur d'Alene National Forest there is a total volume of white pine amounting to 1,250,000 M.B.F. During the seasons of 1930 and 1931, there were 29,957 trees treated at a total cost of \$176,366. These 29,957 trees represent a total volume of some 15,000,000 B.F., valued at \$60,000. Obviously one can not take the value of the timber which has been treated as a justification for

control, nor can a reduction in the infestation following control be taken as a measurement of success. An exact measurement would be the difference between the infestation following control and what the loss would have been had no work been instituted. The weakness of such a formula is that only one of these figures is ever available, and in applying it to the Coeur d'Alene project one is obliged to compute the loss which would have occurred had no control been instituted. To do so it is necessary to determine the potential increase which would have occurred from the trees treated during the operation. From conditions observed within adjacent forests, and from more intensive studies, it has been estimated that for the years 1930 and 1931 an increase of 1 to  $2\frac{1}{2}$  would be a conservative estimate of the rate of increase which could have been expected. In the following tabulation the results of applying this ratio of increase to the trees treated on the Coeur d'Alene project is shown. It is fully realized that such a procedure is open to criticism, and we regret that regardless of this criticism it still seems to be the best method of attempting to show the success of this project. By applying a ratio of increase of  $1-2\frac{1}{2}$  to the trees treated in 1930 for a two year period, and to those treated in 1931 for one year, a saving of 160,545 trees, or 80,272 M.B.F., is shown, valued at \$4.00 per M. or \$321,090. To effect this paper saving of timber, \$176,366 were spent in the application of control, which shows a net saving of timber amounting to \$144,724. To carry these figures forward into the year 1932 in an attempt to foresee the benefits which will accrue from the 1932 operation is rather impossible as one can hardly estimate what the ratio of increase

for the 1932 season will be. However, it is obvious that if the timber which was saved by the previous two seasons of control were carried into the year 1932 at a reduced ratio of 1:2 or even 1:1 $\frac{1}{2}$  it will readily be seen that a tremendous volume of timber would be shown as a saving.

TABLE  
SHOWING STATUS OF INFESTATION HAD NO CONTROL BEEN INSTITUTED

1930 Operation

		<u>Expenditures for Control</u>
22,841	- Trees infested 1929 & treated 1930 - Cost of Treatment	\$123,360
<u>2<math>\frac{1}{2}</math></u>	- Ratio of increase from 1929 infestation to 1930	
57,102	- Trees saved by 1930 control operation. Trees estimated at 500 B. F. per tree, and valued at \$4.00 per M. Value \$114,204.	
<u>7,116</u>	- Trees existing on area after control - 1930 attack.	
<u>64,218</u>	- Infestation on forest had no control been instituted.	

1931 Operation

57,102	- Trees saved by 1930 operation.	
<u>7,116</u>	- Trees existing after 1930 operation, treated in spring of 1931	53,006
<u>64,218</u>		
<u>2<math>\frac{1}{2}</math></u>	- Ratio of increase	
160,545	- Trees saved by 1930 and 1931 operations.	
<u>500</u>	- Trees estimated to contain 500 B. F.	
80,272.500	- Board Feet	
80,272.5	- M. Board Feet	
<u>\$4.00</u>		
<u>\$321,090.</u>	- Value of timber saved by control in 1930 and 1931	<u>\$176,366</u>
		Total Expenditures

\$321,090  
176,366  
\$144,724 Net Timber Values Saved

It is fully realized that the data as given above are hypothetical in character, and subject to question. They have been offered for what they may be worth, and to show that the success of our white pine projects, not only on the Coeur d'Alene but on the Kootenai and other forests as well, must not be measured entirely by the per cent of reduction which follows the institution of control. Though there seems to be no unquestionable way of showing the actual success of this project, one can sincerely state that from the institution of control a serious epidemic has been prevented which would have destroyed a tremendous volume of valuable white pine. The soundness of this position is based upon the character of the infestation as it occurred in 1930 at the time control measures were introduced, and from what has happened in other adjacent forested areas.

Obviously the further that the above data are projected, the greater will be the paper saving shown, so that in a very few years more timber would be saved than existed on the entire forest. Therefore, in all control projects directed against outbreaks of the mountain pine beetle in white pine there should be a place in the plan of operation where control can be discontinued with no immediate fear of the scattered infestation which remains. Just where in the life of the project this point actually is, and when reached how long the infestation must be maintained at that level is not clear. In considering this problem one must carefully consider the biological factors involved which result in variable conditions, making a positive rule difficult to establish.

We are now confronted with what is considered as the necessity for the third year of control, with more trees to treat in 1932 than in 1931. This increased infestation is due very largely, if not entirely, to a heavy blow-down which occurred in April, 1931, leaving thousands of white pine trees scattered throughout the forest, which are nearly all lightly attacked by the mountain pine beetle. Relative to these light attacks, it is roughly estimated it is true that the attacking insects from at least four of these windfalls would have been necessary to attack and overcome the resistance of one green, healthy tree. However, with the knowledge of the tremendous heavy broods which are produced within this very favorable host material, each of these windfalls has been regarded as a bug tree requiring treatment, and considered as having the same potential danger as a standing infested tree. However, even after a correction for these windfalls has been applied to the data, there still remains more trees to treat in 1932 than in 1931. Faced with this condition, it is rather apparent that in some areas additional control can not be expected to give a much greater reduction than has already been secured, unless an effort would be made to locate and treat all infested trees upon the forest regardless of their location or the severity of the infestation, which would undoubtedly prove to be uneconomical. The mountain pine beetle is present in all of our mature white pine forests. The losses resulting from these endemic or so called normal insect losses, though varying from year to year, would seem to be about one-half of one per cent of the total white pine volume of the area. Data taken from the Independence Creek study, Coeur d'Alene National Forest, where a normal infestation was followed for six years, show that during this period, which includes a marked rise in

the infestation amounting to 1-4/10 per cent of the total white pine volume of the area, averaged 6/10 of one per cent per annum. From the 1931 survey we find that on a number of the Coeur d'Alene areas the infestation has been reduced to such a low point that under ordinary conditions it would be considered as being a normal situation only. Granting that this may be true, one is confronted with the task of determining if the infestation will remain in this so called normal condition or if it will prove to be sufficiently strong to rebuild into another epidemic condition. The 1930 survey produced similar situations to those encountered in 1931. However, control was recommended for several of these areas, perhaps on a truly safety first basis, with the idea that it would be necessary to hold the infestation to this point for at least another year. In planning for the institution of control on certain units of this project in 1932, consideration has been given to this factor of normal degree of infestation.

Why a greater reduction in the infestation has not followed the control measures as instituted is a problem for consideration. To account for the reinfestation which has occurred it is apparent that insects are either flying into the control units from adjacent or remote untreated infested areas, or else sufficient infested bark surface to produce this reinfestation was left untreated during the project. If this supply of untreated infested bark surface is left as a result of poor workmanship, it would seem that this phase of our projects can be improved. On the other hand if this reinfestation arises from overwintering broods of new adults, difficult to treat with our peeling methods of control, or from early attacks originating from overwintering broods of new adults, or

perhaps from attacks in the tops of trees, etc., factors which are beyond the control of the project administration to eliminate, it is obvious that the methods and application of control are at fault and not the workmanship. In considering the possibility of insect flights, reference is made primarily to those from remote areas, as there can be no question but that there is a local interchange of insects between small control units which becomes an important factor in all large scale projects. If the possibility of long flights is eliminated as a source of reinfestation, the 1931 attack must be explained by short flights of insects from untreated areas adjacent to control units or from infested bark surface left during the operation by one of the two sources just mentioned. From the character of the work as conducted during the past two seasons, one must feel that if untreated bark surface is responsible for this reinfestation, it originates far more from the uncontrollable sources mentioned than from poor workmanship. It is not claimed that the work as conducted was 100 per cent perfect, as trees were missed and undoubtedly improvements can and will be made in this coming season's operation. However, if the 1931 reinfestation on the control units is attributed to poor workmanship, a position to which we do not subscribe, it would seem that the possibility of securing a much greater reduction is somewhat hopeless, for the work as conducted was of a character that an improvement of such magnitude is not believed to be possible. Though trees missed during the operation contributed their share to the 1931 attack, the main source of this reinfestation is believed to lie partly with the insect broods which were beyond the power of the control crew to locate and treat, and, most important of all, from short flights of insects from adjacent untreated units within the project area.

All of our projects have been based upon a 100 per cent cleanup of all areas selected for control and a sincere effort has been made to reach this objective. In combatting an infestation of this character there is perhaps a question as to the extreme to which one should intensify spotting so that no trees will be missed. Just what degree of infestation justifies the institution of control, and to what extent do the lightly infested areas which are left untreated act as potential sources of reinfestation to those units covered by control are questions of some moment. These are problems which will require separate answers as they may relate to different insect situations, but it is believed that from this project additional information, if not definite solutions, will be offered for these problems.

The Coeur d'Alene project comprises 127,420 acres of white pine type containing infestations of the mountain pine beetle in different degrees of severity. To attempt to cover this entire acreage with a 100 per cent control for the purpose of locating and treating all infested trees would be economically impossible. As a result of the operation as planned for the past two seasons, which has called for the treatment of the more heavily infested units, a serious epidemic has been eliminated, and an infestation remains which, with the exception of a few areas, would in 1928 have been considered as being only an endemic or normal infestation. The objective of this project can not be considered as an effort to eliminate the insects from the forest, or as a panacea for all future losses,  
and holding  
but as a means of reducing/the epidemic to a normal condition. Our objective has been practically reached, and our task is now one of

determining if this apparently normal infestation which has been secured will remain in that condition, or if it will rebuild into an epidemic condition such as has been eliminated by control. During the past season control was directed against the more heavily infested areas, and this practice will be repeated in 1932. It is hoped that following the 1932 operation the condition of the remaining infestation will be of such nature that further control can be abandoned. This decision, which will be based upon the results of a 1932 survey, will necessarily be tempered with the status of the infestation within adjacent forests, and full advantage taken of any natural breaks which may occur in the infestation.

#### THE RESULTS OF 1931 COEUR D'ALENE SURVEY

The Coeur d'Alene insect survey started August 3 and ended October 5, 1931. As in 1930, the survey was conducted with a five-man crew, comprising four compass men and a packer. Sixteen moves were made during the survey, some of which were over twenty miles in length. Six head of mules and a saddle horse were used for transportation, which proved very satisfactory. Provisions were requisitioned both from the Forest Service warehouse in Spokane and from local ranger stations.

A change from the usual method of cruising insect infested timber was instituted on this survey in that test of the merits of single and double strips was conducted. It was thought that two men working together on a two-chain strip would be more efficient than one man working a one-chain strip alone. The reason for this is perhaps a psychological one, for while running a sample strip of four miles or more in length and

and finding only two or three infested trees, one's mind is apt to wander from the monotony of the work. As these infested trees are extremely difficult to detect it is necessary to concentrate very closely and to examine carefully all white pine trees on the strip if the data are to be accurate. Therefore, two men alternating with the compass tend to keep up their interest in the progress of the work.

In working these two-chain strips, one man paces, runs the compass and watches the trees on a strip one chain in width, while the other man watches the trees on the adjoining strip. The men change places about every mile so that each has an equal amount of compass work. In addition to recording the infested trees the compass man counts all of the green white pine on his strip, for the purpose of securing data from which the per cent of stand infested can be determined. During this survey 63 single and 62 double strips were run, on which a total of 5,955 sample acres were examined. The following table shows comparative results of the two methods of survey. The Steamboat drainage is the only area worked out as a separate unit because it is the only one where the strips were plotted parallel for the purpose of this check.

#### STEAMBOAT CREEK

Double Strip			::	Single Strip		
Acres of	: New Attacks	: New Attacks	::	Acres of	: New Attacks	: New Attacks
Strip :	:	per Acre	::	Strip :	:	per Acre
536	:	17	::	.0317	::	272
						14
						: .0515

#### ENTIRE FOREST

4,038	:	444	:	.110	::	1,917	:	161	:	.084
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The table shows that in Steamboat the single strips ran  $62\frac{1}{2}$  per cent higher in infested trees per acre, while for the entire forest the reverse is true and the double strips ran 31 per cent higher than the single strips. However, this does not present an entirely true picture as single strips were not always run in the more heavily infested timber. Double strips were more apt to be plotted through the more important areas. This is more true of the forest as a whole though than for the Steamboat drainage, where single strips and double strips were plotted parallel, twenty chains apart. Double strips do not cut down on the distance traveled per day; in fact, the average is a trifle higher than for the single strip. Double strips average 32.5 acres per man day while the single strips average 30.4 acres.

So much contradiction is shown by these two sets of figures that it is felt that too little data has been secured to form conclusions in regard to the advantages of these two methods. In 1932 additional test of these methods will be conducted.

The following tables show the tabulated results of the 1931 survey, with recommendations for control during the 1932 season. Short notes relative to the different areas follow each table.

LITTLE RIVER DISTRICT

Units	;			% of	% of	New	:White Pine:	% of	Total	Control
	Acres Surveyed:	New Attacks	:Increase:	Attacks	Stand	White Pine:	New	Recom-		
	✓	Per Acre	or	which are	Per Acre	Stand	Attacks	mended		
	: 1930 : 1931		: 1930 : 1931		:Decrease: Windfalls		Trees	Infested	on Area	for 1932
Forks	: 1,240	: 2,040	: .110	: .206	: +87	: 14	: 29	: .81	: 420	: Yes
Tom Lavin	: 3,150	: 3,320	: .090	: .090	: 0	: 54	: 17	: .52	: 298	: Yes
Iron Creek	: 3,840	: 4,120	: .050	: .019	: -62	: 50	: 10	: .18	: 78	: No
Cathcart	: 3,440	: 3,200	: .063	: .045	: -29	: 67	: 15	: .29	: 144	: No
Cascade	: 4,560	: 4,640	: .078	: .083	: +6	: 35	: 17	: .49	: 385	: No
Picnic	: 1,360	: 1,680	: .120	: .064	: -46	: 50	: 8	: .78	: 107	: No
Honeysuckle	: 4,160	: 4,320	: .046	: .057	: +24	: 35	: 12	: .47	: 246	: No
Delany-Lindburg	: 3,200	: 3,200	: .030	: .012	: -60	: 50	: 10	: .12	: 38	: No
Lieburg	: 3,820	: 3,920	: .054	: .207	: +283	: 92	: 9	: 2.25	: 811	: Yes
Laverne	: 2,300	: 2,200	: .052	: .085	: +63	: 40	: 18	: .49	: 178	: No
Breakwater	: 3,880	: 4,000	: .054	: .156	: +188	: 72	: 14	: 1.45	: 624	: Yes
Totals	: 34,950	: 36,640	:	:	:	:	:	:	: 3,329	:

#### NOTES ON LITTLE RIVER AREAS

Forks - No control work was conducted within this area during the 1931 operation, which could account in full for the increased infestation.

Tom Lavin - The main portion of Tom Lavin Creek is in good condition, as most of the 1931 infestation lies in the Hamburg Creek drainage, which is included in the Tom Lavin unit. In the preliminary report submitted under date of October 29, 1931, it was stated that this area had not been covered by control during the past season. It now appears that control measures were conducted in this area, and it is regretted that this statement was made, which was the result of misinformation. It is difficult to explain why there was no change in the status of the infestation within this area following 1931 control. Perhaps the untreated infestation in adjacent areas may have contributed to this condition.

Iron Creek - Following the 1930 operation the infestation in this area dropped to .050 trees per acre. Though work was recommended for this area in 1931, this season's survey shows an additional decrease of 62 per cent.

Cathcart - No work was recommended for this area in 1931, as the 1930 attack was only .063 trees per acre. The 1931 survey shows a further decrease of 27 per cent in this infestation.

Cascade - Following the 1930 operation the 1930 attack averaged .078 trees per acre. Though control measures were again instituted in this drainage during the 1931 project, an increase of 6 per cent followed the operations. This increase in the infestation is difficult to explain, though it could have originated from untreated trees within the area, or by short flights of insects from an adjacent infested area. No control is recommended for this area in 1932 as the infestation is relatively light, and it is hoped that the logging operation in Barney and Picnic Creeks will have some beneficial influence upon the Cascade infestation.

Picnic - Though no actual control has been conducted in this area, the infestation decreased from .120 trees per acre in 1930 to .064 in 1931, which was no doubt due to the logging operation under way. No control is planned for 1932.

Honeysuckle - The 1930 attack following the control operation of that season averaged but .046 trees per acre. Following the 1931 season of no control for this area, there was a slight increase of 24 per cent in the 1931 infestation. However, with this increase the infestation is hardly above what would be considered as a normal endemic infestation, and no control is recommended.

DeLany-Lindburg - Though no control has been instituted in this area, the infestation dropped from .030 trees per acre in 1930 to .012 in 1931.

Leiberg - Following the institution of control within this area in 1930, the infestation dropped to .054 trees per acre, and no control was recommended for 1931. The April, 1931, windstorm left large groups of windfalls scattered throughout the area, which are for the most part attacked more or less heavily by the mountain pine beetle. These windfalls are no doubt responsible for the 283 per cent increase in the infestation.

Laverne - The most heavily infested portion of this area has been included in the Leiberg area, for which control has been recommended.

Breakwater - This area is somewhat comparable to the Leiberg region, though there are not quite so many windfalls. The increase from .054 infested trees per acre in 1930 to .156 in 1931 is undoubtedly due to the occurrence of windfalls. No control has been conducted in this area, but is recommended for the 1932 season.

## GRIZZLY MOUNTAIN DISTRICT

Units	Acres Surveyed			% of Increase		% of New Attacks	White Pine:	% of Stand	White Pine:	Total	Control
	1930	1931	1930	1931	Per Acre	or	which are Windfalls	Per Acre	Stand Trees	Attacks Infested	on Area for 1932
Taylor's Camp	2,240	2,720	.045	.126	+180	:	10	17	.74	342	Yes
Fork-Cabin	5,120	5,440	.069	.041	-40	:	29	25	.16	223	No
Can Creek	1,760	1,760	.304	.159	-48	:	4	24	.66	279	Yes
West Fork	2,880	3,960	.045	.042	-6	:	15	15	.28	166	No
Black Canyon		1,000		.053	0	:	0	19	.28	53	No
Clay Creek	2,440	2,320	.061	.054	-11	:	0	32	.16	122	No
Lower Cougar	2,560	3,180	.059	.121	+105	:	52	13	.93	385	Yes
Upper Cougar	4,480	4,040	.038	.053	*39	:	37	18	.29	214	No
Bumblebee	1,900	3,040	.063	.166	+163	:	35	9	1.84	504	Yes
Eighty Day		640			0	:				250	Yes
Totals	23,380	28,100				:				2,538	

NOTES ON GRIZZLY MOUNTAIN AREAS

Taylor's Camp - No control work was recommended for this area in 1931, as following the 1930 operation the infestation was reduced to .045 trees per acre. However, following the 1931 season of no control the infestation increased to .126 trees per acre, which has warranted the inclusion of this area in the 1932 plans of control.

Forks-Cabin - Control work was conducted in this area in the spring of 1929, when a small project was instituted against what was reported to be a local outbreak of the mountain pine beetle. Work was again conducted in the springs of 1930 and 1931. Following the 1931 operation the infestation was reduced from .069 trees per acre in 1930 to .041 in 1931. As a result of this reduction and the low point to which this infestation has been reduced, no control has been recommended for the 1932 season.

Can Creek - Control measures were first instituted in this area in the spring of 1930, and again in the fall of 1930 against that season's attack. Following the fall operation, a 48 per cent reduction in the 1931 infestation occurred. However, as the remaining infestation still averages .159 trees per acre, control measures for this area have again been recommended for the 1932 season.

West Fork - Following control measures which were instituted in this area in 1930, the infestation reduced to .045 trees per acre. Though no control was recommended for this area during the past season, the 1931 survey showed a still further reduction in the infestation amounting to 6 per cent. As the present infestation is only .042 trees per acre no control has been recommended for this area in 1932.

Black Canyon - This is the first season that this area has been covered by the survey, though a few trees were treated in this canyon from the Forks-Cabin camp in 1930 and 1931. As the existing infestation is only .053 trees per acre, no control has been recommended for the 1932 season.

Clay Creek - Control measures were conducted in this area in 1930 and again in 1931. Following the 1930 operation the infestation was reduced to .061 trees per acre. Subsequent to the 1931 operation a still further reduction in infestation occurred, which left an attack of .054 trees per acre. On the basis of this reduction and the present low status of the infestation no control has been recommended for 1932.

Lower Cougar - This area was covered by control in 1930 and again in 1931. However, regardless of the 1931 operation the infestation increased from .059 trees per acre in 1930 to .121 trees per acre in 1931. It is rather difficult to account for this increase, but it is felt that it must have occurred from trees along the higher elevations which were missed during the operation, and by short flights of insects from the untreated areas adjacent. The increased infestation, which averages .121 trees per acre, justifies the recommendation for the control of this area in 1932.

Upper Cougar - Control measures were first instituted in this area in 1931 against an infestation averaging but .038 trees per acre. Following the 1931 control operation the infestation increased 39 per cent to .053 trees per acre. However, regardless of this increase no control has been recommended for the 1932 season. It is felt that the infestation is not of sufficient intensity to justify expenditures for control. This increased reinestation undoubtedly originated from infested trees along the higher ridges which were missed during the operation.

Bumblebee - Control measures were first instituted in the Bumblebee area in 1931. Regardless of this action the infestation increased from .063 trees per acre in 1930 to .166 in 1931, or 163 per cent. This increased reinestation can be accounted for in part by the increased acreage, which included an area on which control had never been instituted. However, trees missed along the higher elevations undoubtedly contributed to this increase. Control measures have been recommended for the 1932 season.

Eighty Day - This is a new area of some 640 acres, on which it is estimated there are 250 infested trees. Due to the severity of this infestation control has been recommended for the 1932 season.

Brown's Gulch - Information received subsequent to this survey is that there are a number of infested trees in Brown's Gulch. It is recommended that this area be examined as early as possible during the coming spring, and that if the status of the infestation warrants such action control be instituted, providing funds are available.

Prado Creek - Though not actually covered by the 1931 survey, a number of red tops were observed in this drainage, and it is recommended that if control is instituted in adjacent areas an examination be made of this drainage and control measures instituted if the situation so warrants.

## SHOSHONE DISTRICT

Units	: Acres Surveyed : New Attacks : % of Increase : % of New Attacks : White Pine: % of White Pine: Total : Control									
	: Per Acre : or : which are: Per Acre : Stand : White Pine: New : Recom-									
	: 1930 : 1931 : 1930 : 1931 : Decrease : Windfalls: Trees : Infested : on Area : for 1932									
Sisson's	: 4,000	: 4,700	: .275	: .132	: - 34	: 8	: 24	: .76	: 855	: Yes
Yellow Dog River:	2,280	2,120	.161	.381	+137	60	34	1.12	803	Yes
Yellow Dog N. S.:	Included in the Yellow Dog River unit.					23				Yes
Yellow Dog Creek:	2,280	4,120	.138	.069	- 50	43	41	.17	284	Yes
Downey Creek	2,560	4,160	.244	.167	- 31	3	42	.40	694	Yes
Flat Creek	3,200	2,840	.126	.080	- 36	83	19	.42	227	Yes
Flat Creek Burn	:	:	:	:	:	:			75	Yes
Brett-Miner	1,980	3,000	.026	.072	+177	94	9	.80	216	Yes
Rock City	2,260	1,400	.104	.016	- 85	100	6	.27	22	No
Cinnamon Creek	:	Burned over. Now being logged.								No
Eagle Cr. W. Fk.	1,640	1,640	.091	No sample strip run.					198	
Eagle Cr. E. Fk.	3,520	3,000	.057	.200	+251	45	12	1.67	600	Yes
Hawksite	4,040	8,000	.098	.139	+ 42	65	12	1.16	1,112	Yes
Cabin Creek	6,500	7,000	.088	.066	- 24	31	13	.51	462	No
Falls Creek	:	6,000	:	.035	:	56	7	.50	210	No
Totals	: 34,260	: 47,980	:	:	:	:	:	:	: 5,763	:

#### NOTES ON SHOSHONE AREAS

Sisson's - Control measures have been conducted in this area for the past two seasons. Following the 1931 operation a reduction of 34 per cent in the infestation followed, leaving the remaining infestation at .182 trees per acre. Though a reduction was secured the infestation is still of sufficient intensity to justify the institution of control for the 1932 season. The Kiebler Creek logging chance has been added to this area. On this sale area there are a large number of infested cull logs which should be treated if control measures are to be conducted on the forest. These cull logs are heavily infested and constitute a real potential menace to the timber stands adjacent.

Yellow Dog River - Control measures were first instituted in this area in the spring of 1930, and then again in the fall of the same year against the 1930 attack. Following the 1930 spring operation the infestation was reduced to .161 trees per acre. Following the fall operation of 1930 an increase of 137 per cent occurred, leaving an infestation averaging .381 trees per acre. It is of course difficult, if not impossible, to accurately explain this increase. One explanation that can be offered is that due to inclement weather in the fall of 1930 the control crews were obliged to move out of this area before all of the trees which had been spotted were treated, leaving a rather large number to act as a potential source of reinestation. Based upon this increase in the infestation and the severity of the 1931 attack, control measures have been recommended for the 1932 season.

Yellow Dog North Side - This area includes 840 acres lying north of the river, and as it is separated from the main portion of the Yellow Dog River unit it is considered separately in the summary, although it is worked from the same camp as the Yellow Dog River area.

Yellow Dog Creek - Control measures were conducted in this area in the spring of 1930 and again in the spring of 1931. Following the 1930 operation the infestation was reduced to .138 trees per acre. A further reduction to .069 trees per acre followed the 1931 operation. Though the infestation for the entire area, which includes an increase of nearly 2,000 acres, is relatively light, control measures have been recommended for a small portion of this unit, which contains the greater part of the infestation. Furthermore, as this area is one of a group of units for which control has been recommended, the infestation on this area could hardly be left untreated to act as potential source of reinfestation.

Downey Creek - Control measures have been conducted on this area for the past two seasons. Following the 1931 operation a reduction in the infestation from .244 trees per acre in 1930 to .167 trees per acre in 1931 was secured. Regardless of this reduction of 31 per cent the infestation is still believed to be of sufficient intensity to warrant its inclusion in the program of control for 1932. Furthermore, it also lies as one of a group of units for which control has been recommended.

Flat Creek - This area includes what is known as the "Flat Creek Burn", which occurred in the late summer of 1929. Control measures were instituted in the drainage in 1930 and in the burn in 1931, as many of the trees weakened by fire had been heavily attacked by the mountain pine beetle during the summer of 1930. Following the 1930 operation in the drainage, the infestation was reduced to .126 trees per acre. Following the 1931 operation in the burn, a further reduction in the drainage of 36 per cent also occurred, leaving the remaining infestation at .080 trees per acre, with only 75 infested trees remaining in the burn. On the basis of this reduction and the fact that the infested trees in the drainage are grouped in a relatively small area in Section 7, control has been recommended for the 1932 season.

Brett-Miner - Control measures were instituted in this area in 1930, which apparently reduced the infestation to .026 trees per acre. In 1931, due to a large accumulation of windfalls in two relatively small areas, the infestation increased to .072 trees per acre, or an increase of 177 per cent. Due to the potential danger of the infested windfalls and to the concentration of the infestation control has been recommended for the 1932 season.

Rock City - Control measures were instituted in this area in 1930, reducing the infestation to .104 trees per acre. Control measures were again conducted in this area in 1931, and a further reduction followed, leaving an infestation of .016 trees per acre. No control is recommended for the 1932 season.

Eagle Creek-West Fork -- The available data for this area is not sufficient to clearly depict the actual conditions. However, in the event that control is instituted on the east fork of Eagle Creek, which has been recommended, a rather thorough examination should be made of the west fork, and control measures instituted if the existing situation justifies such action and funds are available.

Eagle Creek-East Fork - No control has been conducted in this area. The 1931 infestation shows an increase of 251 per cent over that of 1930. There are three white pine timbered areas in this drainage. Two of these are on the south side of the creek and one on the north. The two areas on the south are not badly infested but the one on the north contains a large number of windfalls, of which about 80 per cent are infested. There is also a narrow strip of timber along the creek bottom which is lightly infested. Control has been recommended for this area in 1932.

Hawk Site - Control measures were instituted in this area for the first time in 1931. Following this operation the infestation increased from .098 trees per acre in 1930 to .139 in 1931. This increase is due primarily to the presence of windfalls in Dam Creek, though of course infested trees around the edges of the control units missed by the operation have contributed to this reinfestation, Dam Creek being one of the areas not covered by control.

Cabin Creek - Control measures were instituted in Cabin Creek in the spring of 1931. Following this operation a reduction in the infestation of 24 per cent was secured, leaving an infestation which averages but .066 trees per acre. Due to the fact that this is an isolated area of partly cut-over land and the rather light infestation which exists, no control has been recommended for the 1932 season.

Falls Creek - No control has been instituted in this area except for the treatment of a few trees from the Hawksite camp in 1931. As the present infestation averages only .035 trees per acre no control has been recommended.

FORKS DISTRICT

Units	Acres Surveyed			% of Increase:		% of New Windfalls	White Pine: Stand Trees	% of White Pine: Stand Infested	Total Attacks on Area	Control for 1932
	1930	1931	Per Acre	or Decrease:	Per Acre	which are Windfalls	Per Acre	Stand Infested	New Attacks on Area	Recommended
Big Elk	5,200	4,960	.038	.0	-100	0	17	0	0	No
Potter Creek	3,760	3,860	.096	.091	-6	100	26	.35	351	Yes
Stewart Creek	2,000	2,200	.181	.125	-31	50	16	.78	275	Yes
Flat Creek	3,680	3,680	.041	.044	+07	66	16	.28	162	No
<b>Totals</b>	<b>14,640</b>	<b>14,700</b>							<b>788</b>	

#### NOTES ON FORKS AREAS

ntrol was instituted in this area in 1930, leaving an infestation of .038 trees per acre. Control was conducted in 1931, and the 1931 survey shows no infestation at this time. Though undoubtedly some infested trees within this drainage, they were not encountered by the crew.

- Control measures were instituted in this area in 1930, and again in 1931. A reduction infestation of 6 per cent followed the 1931 operation, leaving .091 infested trees per acre. This infestation is not very heavy control measures have been recommended for the 1932 season, heavy concentration of infestation within these units would become a serious potential source of infestation for all adjacent areas.

- Control measures were instituted in this area in 1930, at which time the infestation was reduced .181 trees per acre. Though no control was conducted in 1931, a still further reduction infestation of 31 per cent followed. However, as the infestation still averages .125 trees per acre, control has been recommended for this area for the 1932 season.

Upper Flat Creek - Control measures were instituted in the Upper Flat Creek drainage in 1930, at which time the infestation was reduced .041 trees per acre. With no control in 1931, the infestation increased to .044 trees per acre, or .07 per cent. However, as the present infestation is only .038 trees per acre no control is recommended for 1932.

#### RECOMMENDATIONS

In the foregoing tables the different areas for which control is recommended have been listed. A summary of these areas, with the acreage, new attacks per acre, trees to be treated, and the cost of treatment, is shown in the following table. From this table it will be seen that the acreage of many of these areas has been reduced so as to include only that portion for which control is considered necessary. The boundaries of these areas are shown on the attached map, and it is recommended that control be extended so as to cover this acreage.

The cost of treatment has been based upon last season's operation, which was \$6.15 actual charge against the project allotment. The cost of control for all the units has been placed at \$53,634.15, which is some \$1,600 more than was set up in the preliminary report. However, if this additional sum is not available the project can be planned in accordance with the previous requested allotment.

It is sincerely believed that the results which have already been secured from the past two seasons of control, with conditions which exist at this time, justifies such an expenditure. It is therefore recommended that the sum of \$53,650 be appropriated for the institution of control on the Coeur d'Alene National Forest in the spring of 1932, in accordance with the plan as outlined in this report.

SUMMARY OF UNITS FOR WHICH CONTROL  
IS RECOMMENDED

Unit	:	Acres on Unit to be Treated	: New Attacks : per Acre on Revised Acreage	Total Trees to be Treated	: Cost of Control, Based on 1931 Operations \$6.15 per tree.
Forks	:	1,000	.233	233	\$ 1,432.95
Tom Lavin	:	3,320	.090	298	1,832.70
Lieburg	:	3,920	.207	811	4,987.65
Breakwater	:	3,000	.208	624	3,837.60
Taylor's Camp	:	2,720	.126	342	2,103.30
Can Creek	:	1,760	.159	279	1,715.85
Lower Cougar	:	2,450	.150	367	2,257.05
Bumblebee	:	3,040	.166	504	3,099.60
Eighty Day	:	640	-	250	1,537.50
Sisson's	:	4,700	.182	855	5,258.25
Yellow Dog River	:	1,200	.496	595	3,659.25
Yellow Dog N. Side:		840	.208	174	1,070.10
Yellow Dog Creek	:	1,000	.180	180	1,107.00
Downey Creek	:	3,120	.179	558	3,431.70
Flat Creek	:	640	.176	112	688.80
Flat Creek Burn	:	160	-	75	461.25
Brett-Miner	:	840	.157	132	811.80
Eagle Cr E. Fork	:	3,000	.200	600	3,690.00
Hawksite	:	8,000	.139	1,112	6,838.80
Potter Creek	:	3,800	.091	345	2,121.75
Stewart Creek	:	2,200	.125	275	1,691.25
<b>Totals</b>	:	<b>51,350</b>		<b>8,721</b>	<b>53,634.15</b>

## COST ANALYSIS 1931 SURVEY

This survey was conducted under an allotment of \$2,500 from the Forest Service insect control appropriation. All expenses of this survey, exclusive of Mr. Terrell's salary, which was paid by the Bureau of Entomology, were charged against this allotment. The following is a brief summary of the cost and man-day production of the 1931 survey. In a study of this summary the non-effective man-days may seem rather high in proportion to the effective man-days, which can be explained by the fact that all of one man's time was devoted to packing and camp work. In this summary, no charges of contributed time for the compiling of data, preparation of report, etc. has been given, so that the costs as shown are for the actual field operation of the survey.

### SUMMARY OF EXPENDITURES

Items	Cost	Cost per mile of strip
Transportation	\$ 439.70	\$ 0.61
Subsistence	183.79	0.26
Wages (4 men)	<u>1,050.08</u>	<u>1.45</u>
Total charge against project	1,673.57	2.32
Contributed Time (Salary of Terrell)	<u>357.50</u>	<u>.49</u>
Total field cost of project	<u>\$2,031.07</u>	<u>\$ 2.81</u>

Cost per Man-Day	\$6.44
Cost per Acre Surveyed (127,420A)	0.0159
Total Man-Days	315
Effective paid Man-Days	139
Non-effective Man-Days	113
Contributed Effective Man-Days	45
Contributed Non-effective Man-Days	18
Total Effective Man-Days	184
Total Non-effective Man-Days	131
Miles of Sample Strip	722 $\frac{1}{4}$
Miles of Sample Strip per Effective Man-Day	3.925
Miles of Sample Strip per Total Man-Day	2.292

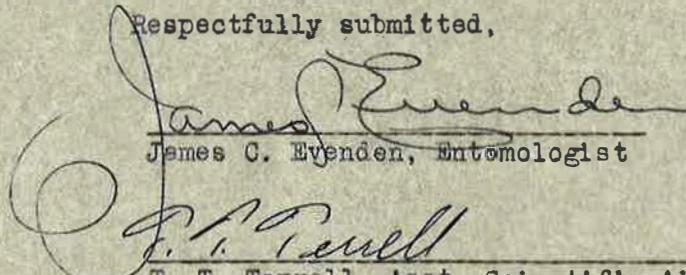
Transportation charges include freight, and the hire of seven head of pack stock and feed, which was considerably higher this year due to the shortage of range. Subsistence averaged \$0.20 per meal for cost of supplies only. Facker's wages are included in the item "Wages", when perhaps they should be subdivided under the two heads of "Transportation" and "Subsistence", as he did most of the cooking. However, as such allocations are always subject to considerable error, no attempt was made to do so.

#### CONCLUSIONS

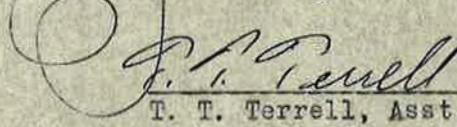
In closing this report an opportunity becomes available to comment upon the splendid co-operation extended to this project by the personnel of the Coeur d'Alene National Forest. Every possible assistance was given by these officers, which contributed not only to the economies of the work but to its efficiency as well.

Comments or criticisms relative to statements made or positions taken in this report will be appreciated, and an attempt will be made to answer any questions which may be asked.

Respectfully submitted,

  
James C. Evenden

James C. Evenden, Entomologist

  
T. T. Terrell

T. T. Terrell, Asst. Scientific Aid

